



INTERNATIONAL ARMAMENTS COOPERATION

The Key to Effective Coalition Operations

“The history of the 20th century has proven time and again that America's security is linked directly to that of other nations, and that America's prosperity depends on the prosperity of others. America seeks to use its current political, economic, and military advantages not to dominate others, but to build a durable framework upon which the United States and its allies and friends can prosper in freedom now and into the future.

Quadrennial Defense Review

September 2001





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INTERNATIONAL DEFENSE COOPERATION AS PART OF DOD'S STRATEGY FOR THE 21ST CENTURY

The geopolitical changes since the end of the Cold War and the imminent threat of international terrorism have dramatically changed the national security environments of the United States, its Allies and Friends.

Over the past decade, while the scale of US military operations has decreased, the tempo has significantly increased. At the same time, the size and capabilities of the US Military (and those of our Allies and Friends as well) have decreased. The missions the US military faces are varied and include peacekeeping, peace enforcement, humanitarian assistance, counter-drug operations, noncombatant operations and - most recently - the war on terrorism. All of these missions can or will require interaction with coalition partners. The war on terrorism, in particular, will require new levels of international cooperation, especially in the areas of interoperability of communications, logistics, and information sharing.

International Defense Cooperation is an essential activity for the US to address these missions, both new and old. Ongoing and future international cooperative programs are critical activities for the Department of Defense. These programs provide DoD:

- Access to global state-of-the-art technologies
- Increased interoperability for both warfighting and support operations
- Economies in the areas of research and development, acquisition, production and lifecycle support

In all cases, the goals of these programs are to exploit opportunities with allied and friendly nations to tap the best intellectual and manufacturing infrastructure, to increase force effectiveness of all parties and to provide the best equipment to the warfighters.



Strategic road maps, including Joint Vision 2020 and the 2001 Quadrennial Defense Review, have been developed to meet the challenges of the 21st Century and stress the importance of international cooperation.

“The ultimate goal of our military force is to accomplish the objectives directed by the National Command Authorities. For the joint force of the future, this goal will be achieved through full spectrum dominance - the ability of US forces, operating unilaterally or in combination with multinational and interagency partners, to defeat any adversary and control any situation across the full range of military operations.”

-- Joint Vision 2020

“The US military will promote security cooperation with allies and friendly nations. A primary objective of US security cooperation will be to help allies and friends create favorable balances of military power in critical areas of the world to deter aggression or coercion. Security cooperation serves as an important means for linking DoD’s strategic direction with those of US allies and friends.”

-- Quadrennial Defense Review, September 2001

The heart of the new strategic approach, transformation of the US military will be aided through the types of international cooperation described in this report. International cooperation programs will broaden the capabilities of the US Military, adding to our interoperability with our Allies and Friends and providing access to new technologies, tactics, techniques and procedures. These additional capabilities will broaden the US

portfolio of capabilities, providing more options to decision makers across a wider range of contingencies.

The aim of this report is to highlight the best of international cooperation. It focuses on a subset of international cooperative activities relating specifically to technology development and acquisition. ☘





INTERNATIONAL COOPERATION SUPPORTS THE QUADRENNIAL DEFENSE REVIEW

International Defense Cooperation supports each of the four policy goals defined in the Quadrennial Defense review.

Assuring Allies and Friends.

The U.S. military will promote security cooperation with allies and friendly nations. A primary objective of U.S. security cooperation will be to help allies and friends create favorable balances of military power in critical areas of the world to deter aggression or coercion. Security cooperation serves as an important means for linking DoD's strategic direction with those of U.S. allies and friends.

If Deterrence Fails, Decisively Defeat Any Adversary.

U.S. forces must maintain the capability to support treaty obligations and defeat the efforts of adversaries to impose their will on the United States, its allies, or friends. U.S. forces must maintain the capability at the direction of the President to impose the will of the United States and its coalition partners on any adversaries, including states or non-state entities. Such a decisive defeat could include changing the regime of an adversary state or occupation of foreign territory until U.S. strategic objectives are met.

Dissuading Future Military Competition.

Well targeted strategy and policy can therefore dissuade other countries from initiating future military competitions. The United States can exert such influence through the conduct of its research, development, test, and demonstration programs. It can do so by maintaining or enhancing advantages in key areas of military capability.

Deterring Threats and Coercion Against U.S. Interests.

A multifaceted approach to deterrence is needed. Such an approach requires forces and capabilities that provide the President with a wider range of military options to discourage aggression or any form of coercion.



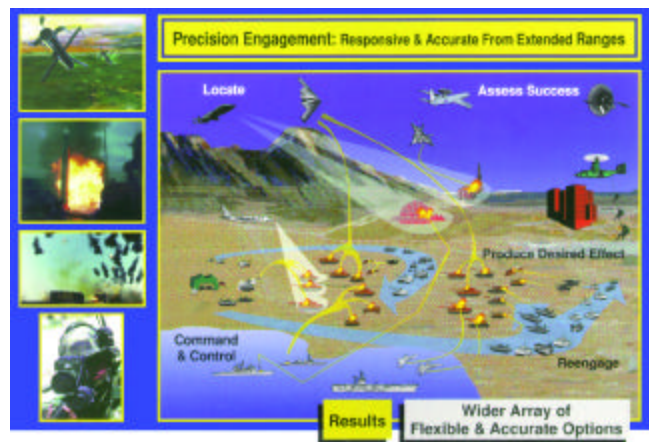
JOINT VISION 2020 FOCUS ON MULTINATIONAL OPERATIONS

Joint Vision 2020 (JV2020) builds upon and extends the conceptual template established by Joint Vision 2010 to guide the continuing transformation of America's Armed Forces. JV2020 stresses the importance of coalition, or multinational, operations. The following paragraphs, quoted from JV2020, highlight this increased emphasis.

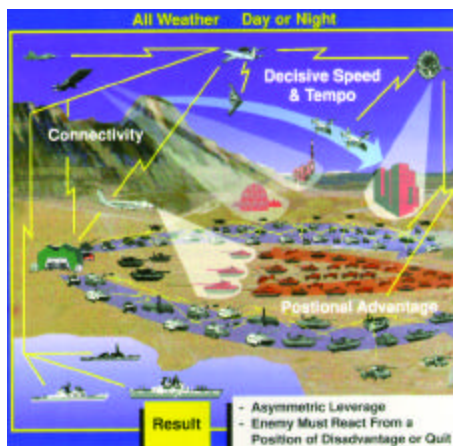
MULTINATIONAL OPERATIONS

"Since our potential multinational partners will have varying levels of technology, a tailored approach to interoperability that accommodates a wide range of needs and capabilities is necessary. Our more technically advanced allies will have systems and equipment that are essentially compatible, enabling them to interface and share information in order to operate effectively with US forces at all levels. However, we must also be capable of operating with allies and coalition partners who may be technologically incompatible, especially at the tactical level. Additionally, many of our future partners will have significant

Precision Engagement



Dominant Maneuver



specialized capabilities that may be integrated into a common operating scheme. At the same time, the existence of these relationships does not imply access to information without constraints. We and our multinational partners will continue to use suitable judgment regarding the protection of sensitive information and information sources.

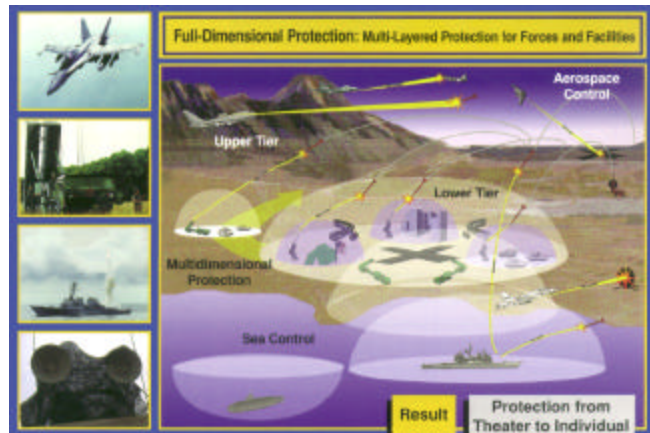
In all cases, effective command and control is the primary means of successfully extending the joint vision to multinational operations.

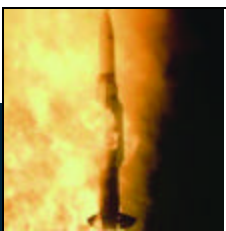
Technological developments that connect the information systems of partners will provide the links that lead to a common relevant operational picture and improve command and control. However, the sharing of information needed to maintain the tempo of integrated multinational operations also relies heavily on a shared understanding of operational procedures and compatible organizations. The commander must have the ability to evaluate information in its multinational context. That context can only be appreciated if sufficient regional expert-

ise and liaison capability are available on the commander's staff. A deep understanding of the cultural, political, military, and economic characteristics of a region must be established and maintained. Developing this understanding is dependent upon shared training and education, especially with key partners, and may require organizational change as well. The overall effectiveness of multinational operations is, therefore, dependent on interoperability between organizations, processes, and technologies."

International cooperative programs are, and will continue to be, an essential aspect of meeting the needs outlined in JV2020. ⌘

Full-Dimensional Protection





NATO SEA SPARROW

Highlighting the international cooperation behind NATO's largest and most successful weapon project, the 32nd celebration of the initialization of NATO's Sea Sparrow project focused on the growth of the undertaking from its four-country beginning to the present thirteen-country consortium.

The Sea Sparrow is a radar-guided, air-to-air and surface-to-air missile with high explosive warheads. The versatile Sparrow has all-weather, all-altitude oper-



ational capability and can attack high-performance aircraft and missiles from any direction. It is widely deployed on more than 150 US and NATO platforms.

The weapons system ties all NATO Sea Sparrow equipment into a ship-wide self-defense system that allows cross uti-

lization of launchers and directors on multi-launcher ships. The result is improved system operational availability, reliability, and effectiveness, which increases the ship's ability to sail in harm's



way and survive. This provides a very effective counter to near- and mid-distance air-breathing threats and lays the foundation for the next generation of self-defense systems.

Rolling Airframe Missile (RAM)

The RAM program is designed to provide surface ships with an effective, low-cost, lightweight self-defense system, which will provide improved capability to engage and defeat incoming antiship cruise missiles (ASCMs). RAM is a joint United States and German venture to design a quick-reaction self-defense system that will increase survivability of otherwise undefended ships.

The RIM-116A RAM is designed as an all-weather, high-firepower, low-cost self-defense system against anti-ship mis-



siles. It uses the infrared seeker of the Stinger missile and the warhead, rocket motor, and fuse from the Sidewinder missile. Due to its high-tech radio-to-infrared frequency guidance system, it requires no shipboard support after the missile is launched. It has been installed on various surface ships like the USS Peleliu (LHA-5) and USS Gunston Hall (LSD-44). The Navy expects to procure approximately 1,000 RAM Block 1 missiles.

While the establishment of a joint international program can be complicated and expensive, the advantages are tremendous. The successful partnering of the United States and Germany empowered the RAM program's development, leveraging funds and technical know-how in such a way as to make the process easier than to try and fiscally justify the independent development, production, and fielding of the system at the expected procurement levels and rates. The joint program enabled the RAM contracts to be accomplished on time and within budget, and resulted in the delivery of an effective and affordable weapon system. RAM's effective-

ness has been demonstrated by the flight success of 106 hits out of 111 firings since the start of production.

NATO AWACS

The NATO E-3 Airborne Warning and Control System (AWACS) is a highly mobile, survivable surveillance system designed to strengthen and significantly improve air defense systems in Europe.

Boeing, as prime contractor, teamed with subcontractors in the Germany, Canada, and the United States to provide the NATO alliance with



18 E-3 systems as part of the largest cooperative acquisition program ever undertaken by the alliance.

The NATO E-3 was built upon the successfully developed and deployed US Air Force E-3. The original US Air Force E-3, often referred to as the "Core E-3," uses an electronically sophisticated radar able to detect high- and low-flying aircraft. Its range extends beyond 400 kilometers when the E-3 is flying at 9,000 meters, and its surveillance volume is scanned by the identifica-

tion friend or foe (IFF), thus providing a means of sorting friendly from hostile aircraft.

The E-3 AWACS fills the needs of both airborne surveillance and command control com-



munications functions for NATO air and maritime forces. An “eye in the sky,” AWACS has a 360-degree view of the horizon, and can track air and sea targets simultaneously.

Intercooled Recuperative (ICR) Engine

The goal of the ICR engine program is to develop the next-generation gas turbine engine for the naval surface fleet. The requirements for the engine focused on affordability through lower operating costs. The primary operating cost savings will be derived from reduced specific fuel consumption of approximately 25% over the US Navy’s current gas turbine prime mover. Proven aero engine components like the compressor, combustor, and turbines were used to maintain an affordable program.

The ICR engine uses a six-stage, fixed-geometry, intermediate-pressure compressor (IPC) and a six-stage, fixed-geometry, high-pressure



compressor (HPC) derived from the RB-211 aero engine. A fresh water loop intercooler is located after the IPC to cool the compressed air prior to entering the HPC. A recuperator is located in the exhaust stack to pre-heat the HPC discharge air prior to combustion. Nine combustor cans derived from the Spey engine were mounted radially to preserve the HP and IP spool lengths, while meeting the requirement to divert HPC air through the recuperator. A single-stage high-pressure turbine and single-stage intermediate-pressure turbine, which power their respective compressors, were also developed from the RB-211 aero engine. The five-stage power turbine design was based on the aero Trent 700 four-stage unit. Variable area nozzles are used to control air flow through the power turbine, thereby controlling power turbine entry temperature and recuperator temperature, which allows high-cycle efficiencies to be maintained at partial power settings.

Joint Strike Fighter (JSF)

The Joint Strike Fighter (JSF) program will develop and field an affordable, highly common family of next-generation multi-role strike fighter aircraft for the Navy, Air Force, Marine Corps, and allies. The cornerstone of the JSF program is affordability- reducing the development cost, production cost, and the cost of ownership. To an unprecedented degree, the JSF program is using cost-performance trades early, as an integral part of the weapon system development process, to enable achievement of an affordable mission effective solution to the Services' needs.



JSF has developed a structure for international participation during the Concept Development Phase. In this structure, there are four levels of involvement:

- Collaborative Development Partnership: Full partnership within a MOA/MOU framework, with the ability to influence requirements. Currently includes only UK.
- Associate/Limited Partnership: Limited participation in specific technologies or core programs, with limited ability to influence requirements. Currently includes Denmark, Norway, and the Netherlands.

- Informed Partner: Allowed access to JSF partner information in order to better evaluate the utility of JSF aircraft for their use, but unable to influence requirements. Currently includes Canada and Italy.
- Major Participant: Participates as a Foreign Military Sales (FMS) customer; provided with JSF studies, technical assistance and access to predetermined data. Currently includes Singapore, Turkey, and Israel.

This program will ultimately build three different designs with high "cost commonality," i.e., the designs will have key, high cost components in common- engines, avionics, and many of the high cost structural components. Cost commonality is projected in the range of 70-90%; parts commonality will be lower, but emphasis is on commonality in the higher-priced parts. Commonality also brings the benefits of common depot maintenance, a commonly supported logistics tail, and increased service interoperability. Development savings from the JSF "family of aircraft" approach are estimated at nearly 40%, compared to three separate stand-alone programs.

Medium Extended Air Defense System

The Ballistic Missile Defense Organization's (BMDO) Medium Extended Air Defense System (MEADS) program is specifically designed to satisfy the requirements for limited area defense and protection of maneuver forces against the increasing threat of tactical ballistic missiles (TBMs) and air-breathing targets, including cruise missiles. MEADS role in the ballistic missile defense architecture will be to bridge the gap between man portable systems like the Stinger

and the higher levels of the missile defense structure like the Patriot Advanced Capability-3 (PAC-3) or the Theater High Altitude Air Defense (THAAD) system while providing continuous coverage for rapidly advancing maneuver forces. When completed, MEADS will be the only missile defense system able to roll off transports with the troops and immediately begin operations.



The MEADS program represents an important international cooperative initiative. In the early 1990's, Germany expressed an interest in joining the Corps SAM program and cooperating on system development and production. Soon afterward, France and then Italy came forward to express their interest in joining. While France chose to drop out of the program, the US signed a Memorandum of Understanding (MOU) with Germany and Italy in May 1996. The US and its European partners have agreed to split work shares and development costs by a ratio of 60% (US), 25% (Germany), and 15% (Italy), although each party has only made commitments to the Project Definition-Validation phase. Additional NATO countries may join the MEADS effort if all participating countries approve.

The first MEADS units could reach the field as early as 2007. ☞



As the world security environment and US military strategy evolve, the role of coalition warfare and multinational operations has become fundamental to US military strategy. Future US military operations (from peace-keeping to major conflicts) will almost certainly involve coalitions. Coalitions provide a broad base of support and add political legitimacy to military operations. They also ease the need for the US to shoulder the major share of the financial and military burden in future multinational operations.

The Coalition Warfare Program (CWP) is a defense-wide effort to assist the CINCs, Services, and Agencies in inserting coalition-enabling solutions into existing and planned US programs. CWP leverages DoD investments in areas critical to coalition operations. The program focuses not only on short-term interoperability-enhancing solutions, but also on early identification of coalition solutions to long-term interoperability issues (architectures, coalition requirements, major system acquisition) with a broad range of potential coalition partners.



Recent coalition operations have shown shortcomings among US and partner nations in the coordination of logistics, intelligence, surveillance, reconnaissance, command, control, and communications. These shortcomings impede US and partner nations' warfighter abilities to efficiently and effectively conduct specific missions and coalition campaigns. Moreover, the growing technological capabilities gap between the US and some of our potential coalition partners exacerbate these problems.



CWP is addressing these deficiencies. It also supports the NATO Defense Capabilities Initiative (DCI), which encompasses five broad areas that place a special focus and priority on interoperability among NATO forces, and where applicable between Alliance and Partner forces, to help narrow the growing capabilities gap.

This program will integrate JV 2020 implementing technologies in coalition doctrine, coalition tactics

and procedures, feasibility studies and technology integration, and implementing leadership initiatives arising from international fora. The program will also serve to expand the scope of Advanced Concept Technology Demonstrations (ACTDs) to encourage allied participation in technology demonstrations with the goal of enhancing interoperability in a coalition environment. For more information about the Coalition Warfare Program, please consult the homepage for the Director of International Cooperation at www.acq.osd.mil/ic. ☒





Coalition Warfare Program

| Project Name | Dominant Maneuver | Precision Engagement | Focused Logistics | Full Dimensional Protection | Information Superiority | Foreign Participants |
|---|-------------------|----------------------|-------------------|-----------------------------|-------------------------|---|
| Coalition Aerial Surveillance and Reconnaissance (CAESAR) | | ◆ | | | ◆ | U.K., Germany, France, Norway, Canada, The Netherlands, Italy |
| Coalition Asset Tracking | ◆ | | ◆ | | | U.K. |
| Air Common Operating Picture/Air Tasking Order | ◆ | ◆ | | | ◆ | Saudi Arabia |
| Coalition Readiness Integrated Management System | | | ◆ | | ◆ | Australia, U.K., Canada, The Netherlands |

Coalition Aerial Surveillance and Reconnaissance (CAESAR)



Develop the data formats, algorithms, procedures, etc., to allow the effective exchange and overlay of ground-monitoring radar pictures among the participating nations.

PAYOFFS

- Ability to effectively exchange and process moving target indicator (MTI) radar.
- Capability of Allied assets to coordinate coverage of geographic gaps between platforms.
- Ability to sustain continuous ground surveillance.
- Leverages capabilities developed in the CAESAR ACTD.



Coalition Asset Tracking



Develop interoperability between the U.K. and US national theater logistics asset tracking systems.

PAYOFFS

- Possible adoption as a formal NATO standard.
- Enable NATO commanders to have a view of prepositioned, incoming and spent allied/coalition assets in theater to facilitate campaign and tactical planning and execution.
- Redresses a key NATO operational deficiency identified by the NATO Defense Capabilities Initiative (DCI).



Air Common Operating Picture/Air Tasking Order



Develop, install, and test the hardware and software necessary to develop an integrated USCENTAF and Royal Saudi Air Force network common operational air picture, air tasking order, shared intelligence, and weather capability.

PAYOFFS

- Create a shared, comprehensive view of the Iraqi No-Fly-Zone and Northern Persian Gulf airspace that does not exist today.
- Help prevent friendly fire incidents.



Coalition Readiness Integrated Management System



Develop and demonstrate a distributed coalition force mission exercise and rehearsal capability.

PAYOFFS

- Improve combined readiness and effectiveness of US and Coalition forces.
- Shift focus to in-situation/on-board training where coalition warfighters train in their real shipboard, cockpit, or workstation environment an exercise.
- Capacity to transfer this capability to any theater.





INTERNATIONAL COOPERATIVE R&D (ICR&D) PROGRAM

The International Cooperative R&D (ICR&D) Program is an important element of the defense acquisition process of DoD. While many other sources of funds are used to pursue cooperative R&D efforts, this program provides funds to augment initial project funding to capitalize on cooperative opportunities until the Military Departments and Agencies can program their own funds throughout the normal Program Objective Memorandum (POM) process. The program has resulted in a substantial number of international cooperative R&D programs with high payoff, for example the Army's Ducted Rocket Effort, the Navy's AV-8B Harrier II Plus radar integration, and the Air Force's F-16 Midlife Update.

Early on, the International Cooperative R&D Program concentrated its efforts on multinational fielded hardware. Today, the highest priority programs are in sub-components of larger systems, areas of technology development, and areas for interoperability improvement. While the "Management Plan for Administration of DoD International Cooperative Research and Development Program (Nunn Program)" of October 1994 is being revised, the following criteria are being used in selecting programs:

- Identify and select those specific international initiatives linked to US Research, Development, Test and Evaluation (RDT&E) and acquisition programs.
- Pursue technology areas of interest that may not be specific to a particular military system, but address general areas of operational need.
- Encourage projects aimed at equipment standardization and interoperability of US systems at the R&D stage, both for existing systems and developmental systems.

The selection criteria for funding include:

- There must be an International Agreement (IA) defining the nature of the project.
- ICR&D funds must be spent in the US
- Allies must contribute an equitable amount of funds in comparison to total US funding.
- The Secretary of Defense (delegated to the USD(AT&L)) must have determined that the project will improve conventional defense capabilities.

More information about the ICR&D Program can be found at the homepage for the Director of International Cooperation at www.acq.osd.mil/ic. ☞



International Cooperative R&D Program Projects

| Project Name | Dominant Maneuver | Precision Engagement | Focused Logistics | Full Dimensional Protection | Information Superiority | Foreign Participants |
|---|-------------------|----------------------|-------------------|-----------------------------|-------------------------|-------------------------------|
| AV-8B Harrier II Plus Program/AGG-65 Radar | ◆ | | | | ◆ | Spain, Italy, Germany |
| Challenging Mini-Satellite Payload (CHAMP) | ◆ | | | | ◆ | Germany |
| Common Missile | ◆ | ◆ | ◆ | | | U.K. |
| Electronic Warfare (EW) Simulation Common Set | | | | ◆ | ◆ | Australia |
| Fighting Vehicle Propulsion Technology Using Ceramic Materials | ◆ | | ◆ | | | Japan |
| Free Piston Shock Tunnel/High Enthalpy Goettingen Project | ◆ | | | | | Germany |
| Future Multiband Multiwaveform Modular Tactical Radio | | | | | ◆ | France, Germany, U.K. |
| Guided Multiple-Launch Rocket System (GMLRS) | ◆ | ◆ | | | | Italy, France, Germany, U.K. |
| Intercooled Recuperative (ICR) Gas Turbine Engine | ◆ | | ◆ | | | France, U.K. |
| Lightweight 155m Towed Field Howitzer System | ◆ | ◆ | | | | Italy, U.K. |
| The Multifunctional Information Distribution System (MIDS)/Low Volume Terminal (LVT) | | | | | ◆ | Spain, Italy, France, Germany |
| RIM-116A Rolling Airframe Missile (RAM) | | ◆ | | ◆ | | Germany |
| Strengthening of Structures for Enhanced Survivability Against Conventional and Terrorist Weapons | | | | ◆ | | Israel |
| Trimaran Hull Project | ◆ | | | ◆ | | U.K. |
| Trajectory Correctable Munition | | ◆ | | | | Sweden |
| Vista Warrior | | ◆ | | | | U.K. |

AV-8B Harrier II Plus Program/APG-65 Radar



- Provides the US Marine Corps an all-weather day/night, multimission capable aircraft that can fly both interdiction missions, plus provide responsive and effective close-air support for tactical ground forces.
- Supports the US and Allied effort to update the day-attack Harrier II under the Harrier II Plus Remanufacture Program.

PAYOFFS

- Costs of the entire R&D effort were shared equally amongst the program's three partners.
- Allied contribution was 66% or \$110M of the total R&D cost.
- Appreciably enhanced rationalization, standardization, and interoperability (RSI) goals with Italy and Spain.



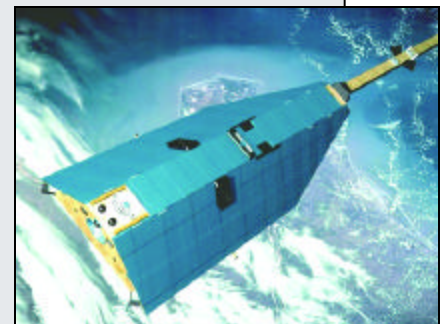
Challenging Mini-Satellite Payload (CHAMP)



- Spaceflight test of a Digital Ion Drift Meter on German Aerospace Center (DLR) scientific research satellite, complementing the other space environment sensor experiment packages.
- Demonstrated technologies required to fly on National Polar Orbiting Environmental Satellite System (NPOESS).
- Concept solution to satisfy Air Force Space Command requirement to measure key space environment parameters.
- Satellite was launched 15 July 2000; the payload is operating successfully and generating valuable data.

PAYOFFS

- Risk reduction for, and miniaturization of, key space environment sensor technologies.
- Share enabling technologies and reduce development costs.
- Demonstrate interoperability with allies during long-term space missions.
- Leverages Allied commitment of \$1M in international co-development.



Common Missile (CM)



- US/U.K. joint missile development program. Requirements include: Capability of being launched from multiple ground and aerial platforms; replace existing TOW and HELLFIRE missiles. Backward compatible with existing TOW and HELLFIRE launchers. Primary missile for Comanche. Available for initial deployment of Future Combat Systems.
- Defeats advanced anti-armor and other critical and high value targets.
- Program MOU signed in December 2001 for PD/RR phase. Enter SDD in FY04 and Production in FY08. A technology insertion activity will be conducted in parallel with the Production and Deployment phase to leverage evolving advanced technology.



PAYOFFS

- Enhances bilateral interoperability, operational flexibility; leverages early U.K. funds (\$9.90 M USD) to reduce overall program risk early in the PD/RR phase; reduces logistics burden and reduced cost of ownership.

Electronic Warfare (EW) Simulation Common Set



Develop a common set of electronic countermeasures (ECM) simulations that will be used to investigate the EW effects of specific missile systems, and to establish ECM parameters for EW systems used by the Army, Navy, and Air Force. Research and Development Project Arrangement signed in US and Australia in November 1996.

PAYOFFS

- A "common set" of advanced methodologies for simulating ECM necessary to defeat emerging high-technology missile systems. This will include ECM technologies against infrared, electro-optical, and radio frequency guided missiles to determine any deficiencies. Results will be transitioned to Army ECM equipment development programs such as RAH-66, Comanche IMP, AH-64 Apache upgrades, FAVV Apache Longbow, AFAS, FARV, FSV and FMBT.
- Leverage Australian expertise/progress in this area.
- ICR&D funds have potential to leverage an allied contribution of \$2.085 million or 50% of the project.



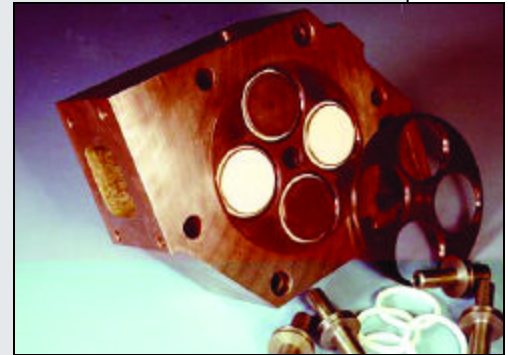
Fighting Vehicle Propulsion Technology Using Ceramic Materials



Develop breakthrough diesel engine technology for ground fighting vehicles with emphasis on high power density and low fuel consumption using ceramic materials.

PAYOFFS

- High power density propulsion for increased mobility and increased fighting capability.
- Lower fuel consumption for decreased logistic burden.
- Technologies applicable to future combat vehicle diesel engines.
- ICR&D funding levels of \$7,800K Nunn, \$4,900K Army, and \$13,000K Allied contribution.



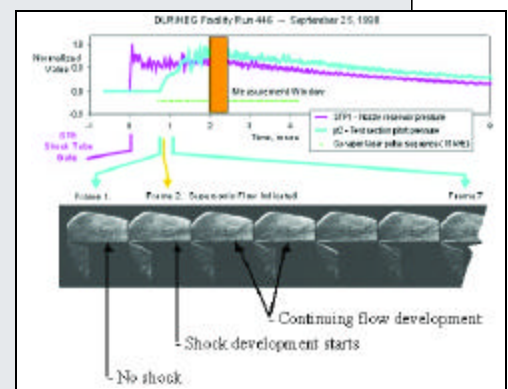
Free Piston Shock Tunnel/ High Enthalpy Goettingen Project



- Developed innovative instrumentation to obtain data to validate computational fluid dynamics codes.
- Supports development of hypersonic flight system components of Missile Defense programs, and other future hypersonic flight systems.
- Shown are images depicting the hypersonic flow process obtained with a high-speed flow visualization system.

PAYOFFS

- Developed high-speed flow visualization and laser doppler absorption techniques.
- High-speed flow visualization for lethality and aerobreakup tests.
- Laser doppler absorption can measure turbine and rocket emissions, mass flow, and thrust.
- Leveraged Allied commitment of \$2.7M in international co-development.



Future Multiband Multiwaveform Modular Tactical Radio



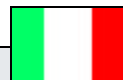
- Defined, tested, and implemented a system to share new communications waveforms and technologies for implementation on software-based and reprogrammable radio systems.
- Demonstrated the interoperability of a common test waveform across various unique radio platforms, including the US SPEAKeasy system.
- Supports satisfying requirements for flexible and interoperable communications systems for international military coalitions.

PAYOFFS

- Shared enabling technologies and reduced development costs.
- Improved interoperability with allies.
- Reduced size of communications systems suites for improved transportability and mobility.
- Leveraged Allied commitment of \$6.8M in international co-development.



Guided Multiple-Launch Rocket System (GMLRS)



- Developed as a major upgrade to the M26 series MLRS rocket with the objective of integrating a Guidance and Control (G&C) package to achieve precision accuracy and a new rocket motor to achieve greater range.
- MOU supplement signed: US, Germany, U.K., France and Italy
 - EMD cost of \$180 million
 - US Production scheduled to start FY 03
 - Quantities: US 140,000, Partners 40,000
 - Low Cost inertial / GS guidance technology

PAYOFFS

- Share development costs with other countries.
- Standardized MLRS rocket with other NATO countries.
- Provide technology transfer between Allies.



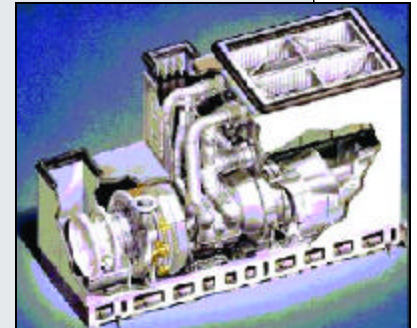
Intercooled Recuperative (ICR) Gas Turbine Engine



- Achieve a significant reduction in annual propulsion fuel consumption on next generation naval ships; completed a series of tests that proved that significant fuel efficiency improvements can be realized and that the engine can perform all operational maneuvers; the U.K. Navy selected the ICR to be fitted into the new U.K. Type 45 Destroyer.; the French Navy is also preparing for potential ICR insertion in their future warships.

PAYOFFS

- Achieved a fuel savings of 27% to 30% over previous engine designs; agreements with the U.K. and France reduce overall program risk by accelerating engine qualification and documentation, thus reducing US investment; procurement by the US, U.K. and France would provide a high probability of third party sales of the engine leading to benefits associated with rationalization, standardization, and interoperability (RSI); ICR design will facilitate future environmental compliance with projected US and European air emission standards; ICR&D funding levels of \$7,800K Nunn, \$4,900K Army and \$13,000K Allied contribution.



Lightweight 155mm Towed Field Howitzer Systems



- USMC has a valid, approved, high-priority requirement for an advanced towed lightweight howitzer that meets increased operational thresholds for mobility, survivability, deployability and sustainability in an expeditionary environment.
- US Army shares the same fire support requirement for its light forces.
- LW155 has vastly improved capabilities over the M198 Howitzer, and it is the most likely alternative to meet the Corps' need for an expeditionary extended-range general support weapon system.

PAYOFFS

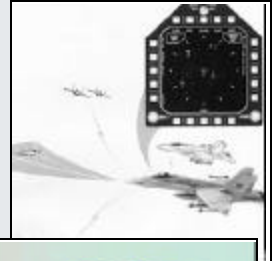
- Owing to the incorporation of innovative design concepts, the LW155 will be able to achieve mobility through its light weight, without sacrificing range, stability, accuracy, or durability.
- Compatible with the full family of US and NATO 155mm munitions and is capable of being towed by the current family of 5 ton trucks, being secured aboard naval amphibious vehicles, and being transported by medium lift helicopters.
- Cooperation with Italy and the U.K. ensures that the LW155 will be produced to meet their requirements along with those of the US



The Multifunctional Information Distribution System (MIDS) Low Volume Terminal (LVT)



- The Multifunctional Information Distribution System (MIDS) is a tactical, secure, jam resistant voice and data communications, navigation, and identification system intended to support key theater functions such as surveillance, identification, air control, weapons engagement coordination, and direction.
- MIDS is the next generation of Link-16 terminals that will be used by the United States and allies in France, Germany, Italy, and Spain. It will provide wide-area communications among MIDS and Joint Tactical Information Distribution System (JTIDS) equipped platforms.
- MIDS is the DoD's first successful major cooperative development of an electronic systems program.



PAYOFFS

- Provides secure high data rate tactical data exchange.
- Participating nations intend to pursue consolidation of production orders to achieve better economies of scale in production buys.
- Will provide Link-16 capability to aircraft unable to use JTIDS due to size and weight constraints.

RIM-166A Rolling Airframe Missile (RAM)



- The RIM-116A Rolling Airframe Missile (RAM) is a lightweight, quick-reaction, high-fire-power anti-ship weapon system jointly developed by the US and German governments. This system is designed as an all-weather, low-cost, self-defense system against anti-ship missiles.
- Due to its high-tech radio-to-infrared frequency guidance system, it requires no shipboard support after the missile is launched.
- It is currently installed, or planned for installation, on 83 US Navy and 25 German Navy ships.



PAYOFFS

- Significantly benefits through greater rationalization, standardization, and interoperability (RSI) of common requirements generated by the US and Germany.
- Current Agreement will facilitate the effective and efficient use of industrial, technical, and economic resources required to support the operation and maintenance of fielded RAM systems.

Strengthening of Structures for Enhanced Survivability Against Conventional and Terrorist Weapons



- Modeled, developed, and tested hardening materials, techniques, and processes to increase the strength of concrete and masonry structures for protection against explosive threats.
- Joint project with the US Army and Bureau of Alcohol, Tobacco, and Firearms (BATF).
- Results are being incorporated into Army and Air Force security engineering manuals.

PAYOFFS

- Excellent dual-use potential for retrofit hardening of federal office buildings, improved seismic protection, and infrastructure repair.
- Cost-effective protection of structures at contingency and fixed air bases.
- Leveraged partner country commitment of \$3.8M in international co-development and European air emission standards; ICR&D funding levels of \$7,800K Nunn, \$4,900K Army and \$13,000K Allied contribution.



Trimaran Hull Project



- Offers promise of significant improvements over conventional monohull frigates and destroyers in powering, sensor height, fuel consumption, acquisition cost, sea keeping, susceptibility to detection, and vulnerability to weapons attack.
- The Trimaran concept also offers a large stable flight deck to support helicopters on small combatants.

PAYOFFS

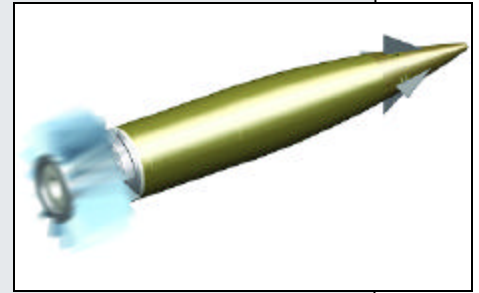
- Due to previous US investments, the US will be receiving test data for a cost of \$8M that would have cost at least \$30M to obtain in a unilateral hull design program of this nature.
- The US is also obtaining critical information to verify the feasibility, affordability, and benefits of the Trimaran design in future warships program such as the 21st Century Combatant (SC-21).
- Interest in this technology has been pursued not only for military projects but also for commercial applications such as passenger ferries.



Trajectory Correctable Munition



- The Trajectory Correctable Munition (TCM) is a cooperative program with the Kingdom of Sweden to develop an extended range, precision-guided, howitzer-launched 155mm-artillery projectile. The prime contractor is Bofors of Karlskoga, Sweden, which was recently acquired by United Defense Limited Partnership (UDLP). TCM uses GPS/IMU technology to guide the projectile's flight path, providing significant improvements in accuracy and first round hit probabilities. TCM's modular design will be capable of incorporating three payload variants. Program is on schedule and within budget.



PAYOFFS

- Increases lethality and reduces logistics for Legacy, Interim, and Objective forces.
- Enhances deep and close fighting in both open and complex terrain through precision guidance.
- Leverages Kingdom of Sweden matching funds – up to \$63 million for development.

Vista Warrior



- Developed and demonstrated helmet-mounted tracker and display technologies, multi-sensor virtual interface techniques, and virtual display and control devices.
- Systems cue sensors and weapons, reduce target acquisition times, improve situation awareness, and reduce operational and safety deficiencies.
- Addresses Joint US Navy and Air Force combat air forces requirements for a helmet mounted cueing system to contribute to air superiority.

PAYOFFS

- Reduced risk and improved technologies for future incorporation in manned fighter aircraft.
- Standardized helmet-vehicle interface.
- Exploit capabilities of high-angle, off-boresight sensors and weapons.
- Leveraged Allied commitment of \$15.7M in international co-development.





The Foreign Comparative Testing (FCT) Program funds test and evaluation of non-developmental items (NDI) from allied and other friendly countries to determine whether these items can satisfy DoD requirements or address mission area shortcomings. The FCT Program is administered by the Director, Strategic & Tactical Systems, Office of the Under Secretary of Defense (Acquisition, Technology & Logistics) (OUSD (AT&L)/S&TS).

Each year the Services and US Special Operations Command (USSOCOM) nominate candidate projects to OSD. The OSD Staff screens the proposals to ensure the proposed non-developmental item addresses valid requirements and has user support, and the sponsoring organization has identified all potential contenders and developed a viable acquisition strategy with a clear intent to procure the item if it tests successfully. OSD evaluates and prioritizes the candidate proposals, and notifies Congress of the intent to fund projects.

Since 1980, OSD has funded 433 FCT projects, and 370 projects have been completed to date. Of the 198 successful evaluations, 118 have resulted in procurements worth over \$5.3 billion in FY 2001 dollars. With an FCT investment of approximately \$762 million, the FCT Program has realized RDT&E cost avoidance of nearly \$3.8 billion. Service and USSOCOM participation is summarized as follows:

| Sponsor | Total Projects Funded (1980-2001) | Total Projects Passed FCT | Projects Resulting from Procurement |
|-------------------|-----------------------------------|---------------------------|-------------------------------------|
| Army | 142 | 70 | 42 |
| Navy/Marine Corps | 180 | 80 | 46 |
| Air Force | 93 | 44 | 26 |
| USSOCOM (95-00) | 18 | 4 | 4 |

The FCT Program results in early fielding of equipment to the warfighter, assists in reducing duplicative R&D, promotes competition and international technology exchange, enhances standardization and interoperability, and improves support during coalition operations.

The FCT Homepage on the World Wide Web contains additional information and may be found at www.acq.osd.mil/sts/fct/. ☞



Foreign Comparative Testing (FCT) Program

| Project Name | Dominant Maneuver | Precision Engagement | Focused Logistics | Full Dimensional Protection | Information Superiority | Foreign Participants |
|---|-------------------|----------------------|-------------------|-----------------------------|-------------------------|-----------------------------|
| Acoustic Cladding Underwater Repair System | ◆ | | | ◆ | | U.K. |
| Aluminum Road Wheels for AAV | ◆ | ◆ | | | | U.K. |
| Atmospheric Diving Suits | ◆ | | | ◆ | | Canada |
| Automatic Chemical Agent Detector Alarm | | | | ◆ | ◆ | U.K. |
| Counter-Sniper/Gunfire Detection System | | ◆ | | ◆ | | France |
| Digital Flight Control System for F-14 | ◆ | | | ◆ | ◆ | U.K. |
| Eagle Vision Deployable Satellite Ground Receiving and Processing Station | ◆ | ◆ | | | ◆ | France |
| Gun Laying and Positioning System | ◆ | ◆ | | | ◆ | Switzerland |
| Improved Chemical Agent Monitor (I-CAM) | ◆ | ◆ | | | ◆ | U.K. |
| Interim Vehicle-Mounted Metallic Mine Detectors | ◆ | | ◆ | | | South Africa, Austria, U.K. |
| Leguan Heavy Assault Bridge | ◆ | | | | | Germany |
| MA-31 Supersonic Sea Skimming Target Missile | ◆ | ◆ | ◆ | | | Russia |
| Maritime Craft Air Deployment System II | ◆ | ◆ | | | | U.K. |
| MILSTAR Traveling Wave Tube | | | | | ◆ | France |
| One Watt Linear Drive Coolers | ◆ | | | | ◆ | Germany |
| RDX/HMX Explosives Qualification | | ◆ | | | ◆ | Norway, Sweden, U.K. |
| Renaissance View Satellite Data | ◆ | ◆ | | | ◆ | France, Canada |
| SPOT Satellite Imagery | ◆ | ◆ | | | ◆ | France |
| Standard Advanced Dewar Assembly - Type II | | ◆ | ◆ | | ◆ | France |
| Submarine Escape and Immersion Ensemble (SEIE) | | | | ◆ | | U.K. |

Acoustic Cladding Underwater Repair System



The system developed by UMC International in the United Kingdom allows trained divers to repair and replace submarine hull silencing tiles.

BENEFITS ACHIEVED

The Navy will achieve significant savings in submarine dry-docking and acoustic cladding costs by using this technology.



Aluminum Road Wheels for the Marine Corps' Advanced Amphibious Assault Vehicle



The Navy/Marine Corps is evaluating the wheels from GKN in the United Kingdom as a lightweight aluminum road wheel for the Advanced Amphibious Assault Vehicle (AAAV). The AAAV office has already procured over 300 road wheels to continue testing on AAAV prototypes.

BENEFITS ACHIEVED

The GKN design is significantly lighter than the US-made roadwheel and is helping the AAAV program achieve its vehicle weight objectives.



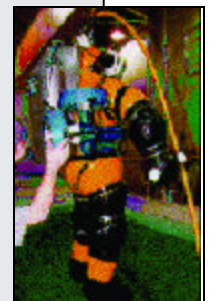
Atmospheric Diving Suit - "NewtSuit"



The suit from International Hardsuit of Canada was evaluated to meet the Navy requirements for Submarine Rescue Diving and Recompression System. This lightweight atmospheric diving system, originally designed for 500 feet water depth, now allows divers to work comfortably and safely in depths up to 2000 feet.

BENEFITS ACHIEVED

- An estimated \$20 million RDT&E cost avoidance.
- NewtSuit is being integrated into the Navy's overall Submarine Rescue Program, along with the adoption of the Submarine Escape and Immersion Ensemble, successfully tested under the FCT Program.



Counter-Sniper/Gunfire Detection System



The system, manufactured by the French company Metravib, is an acoustically based detection system that determines the azimuth, elevation, and range from a registered point to the origin of a shot.

BENEFITS ACHIEVED

Meets urgent need for a system to provide information about the location of sniper and harassing gunfire.



Digital Flight Control System for F-14 Aircraft



GEC Marconi of the United Kingdom developed the digital flight control system that the Navy tested and approved for use in F-14 aircraft.

BENEFITS ACHIEVED

- Solved the Navy's number one flight safety issue for the F-14 aircraft.
- Increased the flight envelope of the F-14.
- Saved the Navy approximately 2 years in development time and \$111.1 million in lifecycle development costs.



Gun Laying and Positioning System



Using a global positioning system receiver with satellite input, this system from Leica Heerbrugg of Switzerland gives accurate position and reduces artillery gun-laying time to the Army.

BENEFITS ACHIEVED

- Reduces gun-laying time by more than one-third.
- Significantly improves the warfighter's capability to quickly and accurately position a battery of non-Paladin howitzers.



Interim Vehicle-Mounted Metallic Mine Detector



The Army evaluated the detector, which is produced by Dorbyl/RSD/LNY Corp. of South Africa, to meet the requirements to detect and mark the location of low metallic content mines and provide blast protection for the operator. It includes two types of mine blast resistant detector vehicles and a series of towed trailers to detect, mark, and clear landmines.



BENEFITS ACHIEVED

The system is a significant improvement over hand-held devices, which were previously the only means of clearing minefields and roadways.

Leguan Heavy Assault Bridge



The Army evaluated and approved the bridge that was manufactured in Germany by MAN Technologies, integrated on the M1A1 Main Battle Tank chassis.

BENEFITS ACHIEVED

Avoided an estimated \$50 million in development costs and 5 years in fielding time.



MA-31 Supersonic Sea Skimming Target Missile



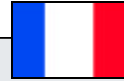
The MA-31 target missile, manufactured by Zvezda Strela of Russia, was evaluated and approved by the Navy for long range-target requirements.

BENEFITS ACHIEVED

Estimated \$320 million in development costs and 7 years in development time.



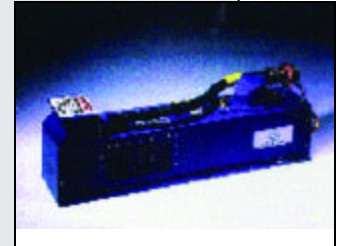
MILSTAR Traveling Wave Tube



The Air Force evaluated the French tube, manufactured by Thomson Tubes Electroniques, for use in ground and airborne terminals for MILSTAR, a joint services survivable satellite communication system. The tubes are air-cooled and are designed for increased operational life in high-power amplifiers.

BENEFITS ACHIEVED

- Provides more power than present traveling wave tubes.
- Incorporates a less expensive, more reliable, off-the-shelf cathode.



One Watt Linear Drive Cooler



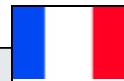
The Army successfully evaluated and approved the coolers from AEG Infrarot Mondules in Germany for use as a cryogenic cooler in the Standard Advanced Dewar Assemblies in second-generation imaging systems.

BENEFITS ACHIEVED

This linear cooler is the most reliable under the various conditions encountered in high-quality image capabilities.



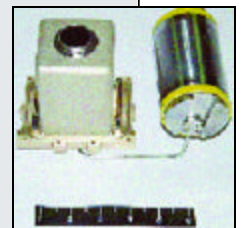
Standard Advanced Dewar Assembly - Type II



This Army project was a follow-on to the successful joint Army/Navy Infrared Focal Plane Array FCT project and the French system designed by SOFRADIR qualified to be an integral part of the second generation forward looking infrared imaging systems and for DoD-wide use in various infrared-imaging systems.

PAYOFFS

- Imaging systems benefit the warfighter by increasing the range of target detection and image fidelity.
- Acquiring the Focal Plane Arrays from SOFRADIR allowed the Army to save an estimated two years in development time and approximately \$5.1 million in development costs.



RDX/HMX Explosives Qualification



Dyno Nobel (Norway), Nexplo Bofors AB (Sweden) and Royal Ordnance (United Kingdom) manufacture Hexogen (RDX) and Octogen (HMX), energetic compounds used in explosive and propellant formulations for weapons production. As the US military manufacturer of these explosive ingredients was to temporarily close production for maintenance upgrades between FY 2000 and FY 2001, this project evaluated the suitability of the foreign manufactured RDX and HMX to meet US requirements.



BENEFITS ACHIEVED

- While Nexplo and Royal Ordnance were ruled out, both Dyno Nobel's HMX and RDX materials were successfully qualified; though it was determined that at the present time there is no need for an additional source for RDX.
- An initial production contract worth approximately \$180,000 for 6,000 pounds of HMX with an option for an additional 5,000 pounds was awarded to Dyno Nobel.
- Follow-on procurement plans for HMX call for competition between Dyno and Holston Army Ammunition Plant when the latter is re-certified to produce HMX.

Submarine Escape and Immersion Ensemble (SEIE)



The submarine escape system produced by Beaufort, Air-Sea of the United Kingdom consists of a cold water escape suit with integral life raft. The project evaluated the system's utility on SSN 688 Los Angeles Class submarines, and the potential for use on the SSN 21 Seawolf and NSSN Virginia Classes of submarines. An initial production contract was awarded in second quarter FY 2000 for 1431 SEIE suits and 32 sets of associated valves manufactured by Hale Hamilton of the United Kingdom, worth approximately \$2.9 million.

PAYOFFS

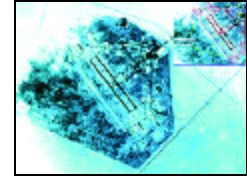
- This system offers capabilities superior to the current US Navy escape system, enabling crews to escape from disabled submarines at greater depths and survive on the surface until rescued.
- Four Los Angeles Class submarines were equipped with the SEIE system in FY 2000 and four more have been selected as installation candidates for FY 2001.





SPOT SATELLITE DIGITAL IMAGER

Satellite digital imagery developed by SPOT Image of France was evaluated successfully in the FCT program by the Air Force beginning in 1990 and was used during Desert Storm for mission planning. Currently, the imagery has been downlinked directly to US Forces in Bosnia and Kosovo via the Air Force's Eagle Vision deployable ground station terminals (see below). SPOT provides US Air Force pilots with imagery that allows near real-time practice "fly-overs," as well as providing ground commanders with valuable intelligence data. In Desert Storm, the SPOT satellite was re-oriented to concentrate on the Persian Gulf area. According to after-action reports, in some cases, the images were the only ones available to the pilots prior to making their airstrike missions.

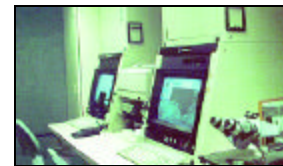


EAGLE VISION DEPLOYABLE SATELLITE GROUND RECEIVING AND PROCESSING STATION

The Eagle Vision system, developed by Matra CAP of France, is a mobile satellite receiving station designed for direct reception and rapid processing of unclassified commercial digital satellite imagery. This system integrates photographic satellite data with elevation data to produce three-dimensional views of flight paths and target areas for mission planning and rehearsal. The Eagle Vision test bed completed FCT field operational testing in FY 1995 and funding was approved to test LANDSAT capability with Eagle Vision for operations in Bosnia. Air Force procurements of Eagle Vision began in 1997. Eagle Vision is being used in support of exercises such as Cope Thunder and Green Flag, as well as air combat operations on the Korean Peninsula.

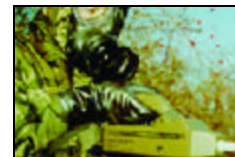
RENAISSANCE VIEW SATELLITE DATA

Commercial satellites can provide a low-cost means to fill the gap between imagery requirements and the ability of existing US surveillance satellites. Building on the successful Eagle Vision FCT project, the Renaissance View FCT project evaluated electro-optical and synthetic aperture radar imagery available from several foreign commercial satellites. Renaissance View dramatically improves information access for a joint or combined commander due to real-time data delivery and all-weather capability with no restrictions on releasability. The system was delivered to the Air Force in August 1997.



IMPROVED CHEMICAL AGENT MONITOR (I-CAM)

The I-CAM, developed by Graseby of the United Kingdom, is a hand-held device for monitoring nerve and blister agent contamination on personnel, supplies, and equipment. It is advertised as an improvement over the CAM, which was successfully evaluated under the FWE program in 1984/85 and type-classified standard in 1988 for Army, Air Force, and Navy use. NATO countries that have also fielded the CAM include Canada and the U.K.. The improved version (I-CAM) is configured with an Army-developed single-sieve scrubber (the ion mobility detection section) with double the previous CAM scrubber volume. This reduces the frequency and level of maintenance, increases shelf life, and lowers the cost. Improvements in the device's circuitry, made by the U.K. manufacturer, also provide increased reliability.



AUTOMATIC CHEMICAL AGENT DETECTOR ALARM (ACADA)

The ACADA provides automatic blister agent and enhanced nerve agent detection capabilities to all the Services and other government agencies. The Graseby Dynamics' alarm was selected and classified as "generic" type for joint service use in FY 1996. Type classification and release for full production occurred in FY 1997, and a production contract was awarded in the same year.

POWER SUPPLY FOR ACADA

This project evaluated a new power supply manufactured by Graseby Dynamics Ltd. for the Automatic Chemical Agent Detector Alarm. The ACADA system, which was successfully tested under the FCT Program and procured for joint service use in FY 1997, provides point detection to automatically detect both blister and nerve agents. Testing was successfully completed at Aberdeen Proving Ground, Maryland. A production decision was made in FY 1998 for the Army and Air Force. The principal advantages in the improved power supply are significant weight reduction and improved unit reliability.





ADVANCED CONCEPT TECHNOLOGY DEMONSTRATIONS (ACTDs)

An Advanced Concept Technology Demonstration (ACTD) is a joint effort by the acquisition and operational (warfighter) communities within the DoD. Typically, ACTDs begin by identifying significant military needs, and then matching them with technology programs ready to focus on a military application. The process has a close tie to the Joint Vision 2020 initiative and new capabilities are pursued within each of the operational concepts of dominant maneuver, precision engagement, focused logistics, and full-dimensional protection. The emphasis in ACTDs is on near-term responses to validated joint military needs. The responses are typically technology based, but usually include new operational concepts and occasionally new organizational structure. These responses must be affordable, interoperable, sustainable, and capable of being evolved as the technologies and threats change. The evolutionary acquisition approach is an integral part of the ACTD concept. The initial requirements and the initial design reflect the performance achievable in the near-term with current technology, but provisions are included to facilitate growth. The basic form of an ACTD generally starts from a collection of mature technologies or technology demonstration programs that are maturing key technologies. The technologies are combined and integrated into a complete military capability. The objective is to provide decision-makers an opportunity to fully understand the operational potential offered by a proposed new military capability before making an acquisition decision. This objective is met by developing fieldable prototypes of the proposed capability and providing those prototypes to the warfighter for evaluation. The warfighter first develops operational concepts designed to fully exploit the proposed capability, and then uses the prototypes and associated operational concepts in realistic military exercises to assess the resulting military utility. During the ACTD, the user also evolves the broad statement of need, which existed at the start of the ACTD, into a definitive set of operational requirements that can support a follow-on acquisition. At the completion of an ACTD, the residual sys-



tems used in the evaluation process are left with the user to provide a limited operational capability.

Each ACTD candidate should respond to a serious need for new or increased military capability, as perceived and articulated by the operational warfighting community (JCS, CINCs, Service operational organizations). Although some ACTDs focus on a service specific capability, the highest priority in the selection process is placed on joint capabilities. ACTDs have become an important vehicle for addressing joint needs.

A primary ground rule for any ACTD is the intimate participation of a “sponsoring” user organization, in partnership with a Service or Agency acquisition organization that will serve as the Technical Management Office. A candidate ACTD must identify and develop this “user/developer” partnership (at least in principle) before serious consideration can be given. In practice, this is likely to be an iterative process, initiated either by the acquisition community as they seek to transition certain maturing technologies emerging from their “6.3” (applied research) world, or by the warfighter community, seeking solutions to a pressing operational need. Another major ACTD goal is to promote operational “jointness” to reach beyond individual service interests and capabilities for integrated, joint missions where this is appropriate and to encourage allied nations participation, where possible. The interests of the warfighter are paramount; however, “guidelines” regarding ACTDs are considered flexible.



The Deputy Under Secretary of Defense (Advanced Systems & Concepts) (DUSD/AS&C) has the oversight responsibility for the ACTD program. The DUSD(AS&C) is responsible for developing and promulgating guidance regarding the ACTD program, for evaluating candidates and approving new ACTDs, and for providing oversight, support, and evaluation of ongoing ACTDs.

“ACTDs are a key element in the S&T program to determine the military utility of proven technologies, expedite technology transition, provide a sound basis for acquisition decisions and develop the concept of operations that will optimize effectiveness.”

Defense S&T Strategy 2000

For additional information about ACTDs, visit the homepage for the Deputy Undersecretary of Defense for Advanced Systems and Concepts at www.acq.osd.mil/actd.





Advanced Concept Technology Demonstration (ACTD) Program

| Project Name | Dominant Maneuver | Precision Engagement | Focused Logistics | Full Dimensional Protection | Information Superiority | Foreign Participants |
|---|-------------------|----------------------|-------------------|-----------------------------|-------------------------|---|
| Synthetic Theater of War (STOW) | ◆ | | ◆ | | ◆ | U.K. |
| Tactical High Energy Laser (THEL) | | | | ◆ | | Israel |
| Navigation Warfare (NavWar) | | | | ◆ | ◆ | U.K. |
| Joint Countermine (JCM) | ◆ | | | | | U.K., Canada |
| Battlefield Awareness & Data Dissemination (BADD) | ◆ | ◆ | ◆ | | ◆ | U.K. |
| Precision/Rapid Counter Multiple Rocket Launcher (P/RC MLR) | | ◆ | | | | Republic of Korea |
| High Altitude Endurance/ Unmanned Aerial Vehicle (HAE/UAV) | ◆ | ◆ | | | | Australia |
| Miniature Air-Launched Decoy (MALD) | ◆ | | | | | U.K. |
| Precision Target Identification (PTI) | | ◆ | | | | U.K. |
| C4I for Coalition Warfare (C4I for CW) | ◆ | ◆ | | | ◆ | Canada, Denmark, France, Germany, Holland, Italy, Norway, Portugal, Spain, U.K. |
| Coalition Aerial Surveillance and Reconnaissance (CAESAR) | | ◆ | | | | Canada, France, Italy, Germany, Norway, U.K. |
| Coalition Theater Logistics ACTD | | | ◆ | | | Australia |

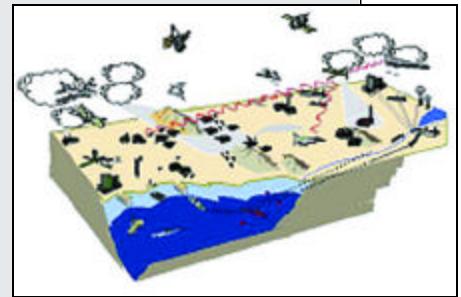
Synthetic Theater of War (STOW) ACTD



Developed and evaluated the capabilities of Advanced Distributed Simulation to improve joint training, mission rehearsal, and experimentation to make it possible to create a virtual battlefield populated with intelligent synthetic forces.

PAYOFFS

- Advancement of the state-of-the-art computer-generated forces, synthetic natural environments, networking, and after-exercise analysis.
- Ability of forces in widely separated bases to participate in exercises or rehearsals.
- Improvement of US/U.K. coalition force training, operations, and warfighting capabilities.
- Transition of STOW technologies to the next generation of DoD simulations (like the Joint Simulation System).



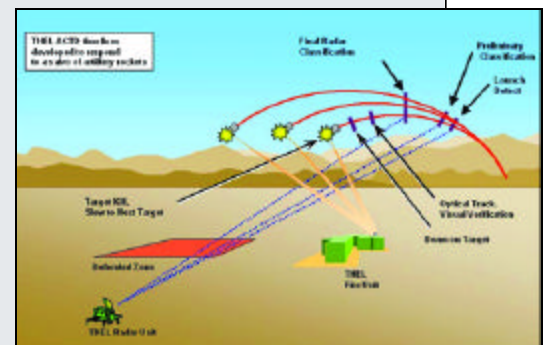
Tactical High Energy Laser (THEL) ACTD



Evaluated the effectiveness of a THEL to negate the threat of Katyusha rockets and other short-range artillery to populated areas in Northern Israel.

PAYOFFS

- Tested the three primary subsystems (the laser, the pointer tracker, command, control, communications and intelligence subsystems) of the THEL demonstrator.
- Developed the fire control and command, control, communications and intelligence (FC/C3I) techniques to take advantage of a laser's rapid response capability for close-in engagements where time lines are very short (such as potential air defense applications).
- Reduced developmental risk and significant cost savings.
- Applied the lessons learned to the development of a mobile THEL capability.



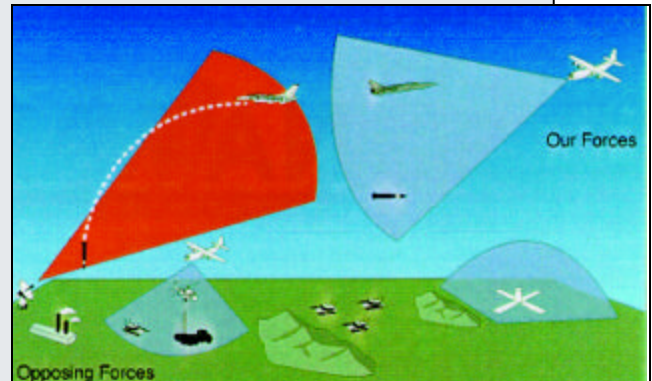
Navigation Warfare (NavWar) ACTD



Developed jamming technologies to prevent the use of satellite-based navigation by hostile forces, as well as the means to protect the use of GPS by the US and friendly forces, without disturbing the use of GPS outside the theater of conflict.

PAYOFFS

- Developed three types of GPS jammers (soda can-sized expendable jammers, and truck and aircraft-mounted jammers).
- Developed two types of protection equipment.
- Developed a Concept of Operations (CONOPS) and procedures for GPS jamming in exercises.
- Resulted in the establishment of an operational requirements document (ORD) for navigation warfare.



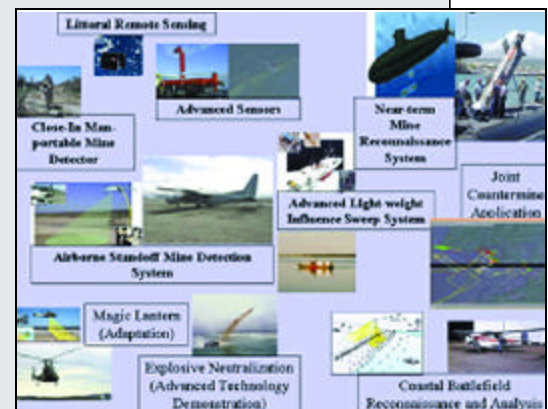
Joint Countermine (JCM) ACTD



Evaluated the utility of new technologies to enhance a Joint Task Force Commander's ability to conduct seamless, amphibious mine countermeasures from sea to land.

PAYOFFS

- Integrated 13 novel systems for both detecting and clearing mines and minefields.
- Conducted two major exercises, and several smaller exercises testing these systems.
- Direct transition of three systems (Coastal Beach Reconnaissance and Analysis, Littoral Remote Sensing, and Joint Countermine Applications) to acquisition programs.
- Indirect transition for several other systems.



Battlefield Awareness & Data Dissemination (BADD) ACTD



Developed, installed, and evaluated an operational system that allows commanders to design their own information systems to maintain battlefield awareness from forward and moving command sites.

PAYOFFS

- Provided the capability for forward warfighters to access and use very large information products that were previously inaccessible.
- Provided the ability to seamlessly integrate information products with emerging 3D visualization applications.
- Provided the ability to manage information flows in a commander's battlespace based on operational priorities.



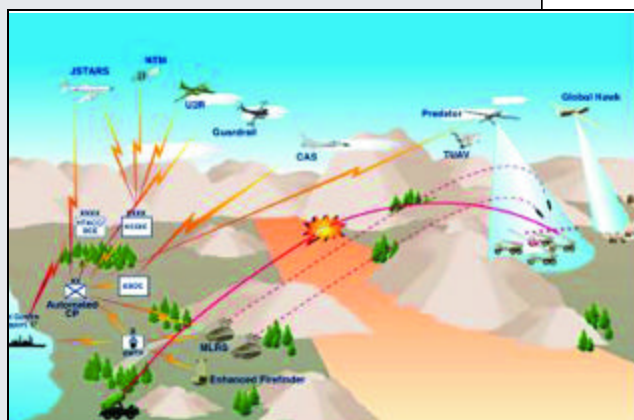
Precision/ Rapid Counter Multiple Rocket Launcher (P/RC MRL) ACTD



Developed a new command and control (C2) architecture to be used in countering the threat posed by North Korean Multiple-Launch Rocket Systems (MLRS) and long-range guns.

PAYOFFS

- Implemented a new C2 architecture for the 2nd Infantry Division (2ID) which met the timelines imposed by the threat.
- Increased the effectiveness of the 2ID through changes in their CONOPS.
- Software developed for this ACTD is now being used by all three Services in Korea, Europe, and Central Command.



High Altitude Endurance/ Unmanned Aerial Vehicle (HAE/UAV) ACTD



Demonstrated an affordable, long-endurance, high-altitude, autonomous UAV to satisfy critical intelligence, surveillance, and reconnaissance (ISR) deficiencies identified during the Gulf War.

PAYOFFS

- Developed in a relatively short timeframe, the Global Hawk UAV to satisfy ISR collection shortfalls.
- Demonstrated sound military utility with over 60 flights and 720 flight hours; recommended by USJFCOM for expeditious operational fielding.
- Formally transitioned to engineering, manufacturing, and design (EMD) and limited rate production acquisition phases.



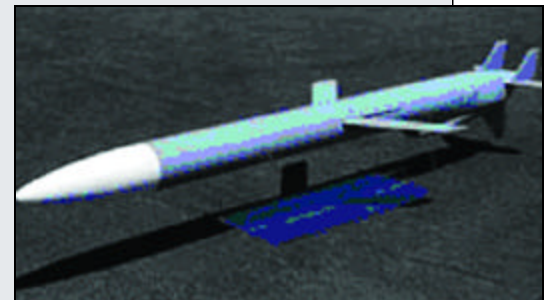
Miniature Air-Launched Decoy (MALD) ACTD



Developed a small, low-cost, expendable air-launched decoy to enhance the survivability of friendly aircraft and aid in establishing air superiority by diluting and confusing surface-based and airborne enemy air defense systems.

PAYOFFS

- Developed an eight-foot long, 100-pound vehicle, powered by an extremely small 50-pound thrust turbojet engine.
- Signature Augmentation System electronically enlarges radar cross-section to appear as fighter-sized image.
- Currently under military utility assessment by Air Combat Command.



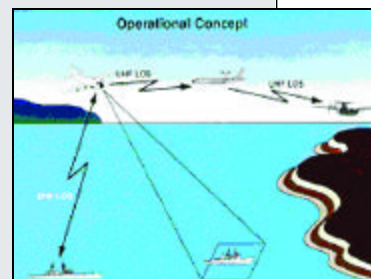
Precision Target Identification (PTI) ACTD



Demonstrate advanced active and passive sensor systems for precision detection and identification of targets from an airborne platform.

PAYOFFS

- Opportunity to militarily assess: advanced ESM systems, third-generation infrared systems, spectral systems and laser radars (LADARs), together with an integrated command, control and communications track dissemination system.
- Provide a day-night target detection, classification and dissemination capability at standoff ranges not achievable by current systems.
- Will provide sensor technology applicable to DoD, US Customs, Coast Guard, Air National Guard, and personnel recovery agencies



C⁴I for Coalition Warfare (C⁴I for CW) ACTD



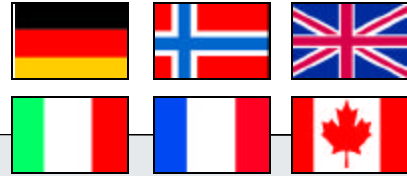
Demonstrate a modular software package that will allow standard US messages to be translated to a NATO standard message format, allowing data to be passed directly between US databases and those of allied countries.

PAYOFFS

- Increase the speed and accuracy of US-to-NATO communications by eliminating the 'sneaker net' between allied command and control systems.
- Software will be DISA Common Operating Environment (COE) compliant, thus usable by any service system that is Global Command and Control System (GCCS)/Defense Information Infrastructure (DII) COE compliant.
- Full capability will allow passage of information covering all aspects of multinational Army command and control, ranging from contact reports to full operations orders.



Coalition Aerial Surveillance and Reconnaissance (CAESAR) ACTD



Demonstrate the interoperability of multinational moving target indicator (MTI) ground surveillance radars, synthetic aperture radar (SAR) platforms, and their processing systems.

PAYOFFS

- Seven nations participating with very active working groups for technical interoperability, architectural development and operations.
- Conducted HORIZON and Tactical Radar live-fly exercises; developing JSTARS, Global Hawk and ASTOR simulations; employed in five Combined Air Operations Centers (CAOCs)
- Completed Calibration and Tracking Experiment (Dec 00)



Coalition Theater Logistics ACTD



Demonstrate the military utility for logistics information technology which provides the coalition warfighter with a fused and integrated near-real-time asset visibility and decision support tools capability. The CTL ACTD will fuse logistics and transportation information for coalition-based rapid crisis response and associated deployment and sustainment plans.

PAYOFFS

- Provide the CTF commander and/or the respective national military chains of command for coalition operations with a responsive and accurate capability for creating and sharing coalition logistics information.
- Provide access for this capability through web-based functionalities within the Global Combat Support System (GCSS) and the Global Command and Control Systems (GCCS) and coalition partners' equivalent national logistics system.
- Appropriate security mechanisms will recognize the sovereignty of national information, controlling what data leaves national systems, is shared in the CTF environment, and what data is allowed to flow back into national logistics systems.





The Defense Data Exchange Program (DDEP), commonly used to describe the sum of all DoD R&D data and information exchange taking place under bilateral and multilateral IAs, is the least complex of formal armaments cooperation activities. Under DDEP, the US and allied or friendly nations may conduct R&D data and information exchange in areas of mutual technical interest through Annexes to Master Data Exchange Agreements (MDEAs).



Not only does such information exchange help avoid duplicative R&D investment in its own right, it also assists in identifying potential cooperative RDT&E projects that will further conserve scarce R&D funds through sharing of development costs under cooperative R&D IAs. ☘

| | Army | Navy | Air Force |
|--------------|------|------|-----------|
| Established | 215 | 277 | 131 |
| Proposed | 24 | 32 | 8 |
| Total | 239 | 309 | 139 |



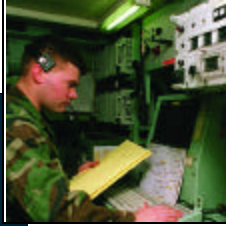
Cooperative logistics refers to any cooperation between the US and allied or friendly nations or international organizations in the logistical support of defense systems and equipment used by the cooperating armed forces. Cooperative logistics is a logical extension of the acquisition process, but being also a substantial part of military operations, much of the implementation process involves security assistance and foreign military sales processes and procedures. Even though some of the processes described in part of this chapter are under the cognizance of DSAA, they are included here for completeness.



Cooperative logistics support includes:

- Logistics Cooperation IAs, used to improve sharing of logistics support information and standards, and to monitor accomplishment of specific cooperative logistics programs;
- Acquisition and Cross Servicing Agreements (ACSAs);
- Host Nation Support (HNS);
- Cooperative Logistics Supply Support Arrangements (CLSSAs);
- Cooperative Military Airlift Agreements (CMAAs);
- War Reserve Stocks for Allies (WRSA);
- Agreements for acceptance and use of real property or services; and
- Standardization of procedures under America/Britain/Canada/Australia/New Zealand (ABCANZ) auspices.

As well as agreements focusing specifically on logistics, other Defense Cooperation Agreements, such as those recently concluded with several Middle Eastern countries, provide for those countries to furnish logistics support to US forces deployed during regional contingencies. ☞



GLOSSARY OF ACRONYMS AND ABBREVIATIONS

| | |
|------------|---|
| AAAV | Advanced Amphibious Assault Vehicle |
| ABCANZ | America, Britain, Canada, Australia, New Zealand |
| ACSA | Acquisition and Cross Servicing Agreement |
| ACTD | Advanced Concept Technology Demonstration |
| ASCM | Antiship cruise missile |
| ASD | Assistant Secretary of Defense |
| AWACS | Airborne Warning and Control System |
| C3I | Command, control, communications and intelligence |
| CAESAR | Coalition Aerial Surveillance and Reconnaissance |
| CINC | Commander-in-chief |
| CLSSA | Cooperative Logistics Supply Support Agreement |
| CMAA | Cooperative Military Airlift Agreement |
| COE | Common Operating Environment |
| CONOPS | Concept of Operations |
| CWP | Coalition Warfare Program |
| DCI | Defense Capabilities Initiative |
| DDEP | Defense Data Exchange Program |
| DSAA | Defense Security Assistance Agency |
| DUSD(AS&C) | Deputy Under Secretary of Defense (Advanced Systems & Concepts) |
| ECM | electronic countermeasures |
| EU | European Union |
| FAADC2I | Forward Area Air Defense Command, Control & Intelligence |
| FCT | Foreign Comparative Testing |
| GPS | Global Positioning System |
| HPC | High-pressure compressor |

| | |
|-----------|--|
| HNS | Host Nation Support |
| IA | international agreement |
| ICR | Intercooled Recuperative Engine |
| ICR&D | International Cooperative Research and Development |
| IFF | identification friend or foe |
| IPC | intermediate pressure compressor |
| JCS | Joint Chiefs of Staff |
| JFCOM | Joint Forces Command |
| JV2020 | Joint Vision 2020 |
| MDEA | Master Data Exchange Agreement |
| MIDS | Multifunctional Information Distribution System |
| MLRS | Multiple-Launch Rocket System |
| MOD | Ministry of Defense (United Kingdom) |
| MTI | moving target indicator |
| NATO | North Atlantic Treaty Organization |
| NDI | non developmental item |
| POM | Program Objective Memorandum |
| RAM | Rolling Airframe Missile |
| RDT&E | Research, Development Testing & Evaluation |
| RIB | rigid-hull inflatable boat |
| SAR | synthetic aperture radar |
| SEIE | Submarine Escape and Immersion Ensemble |
| TCM | Trajectory Correctable Munition |
| TMD | Theater Missile Defense |
| TOC | Tactical Operations Center |
| USD(AT&L) | Under Secretary of Defense (Acquisition, Technology & Logistics) |
| WRSA | War Reserve Stocks for Allies |

*Multinational activities demonstrate US
commitment, lend credibility to its alliances, enhance regional
stability, and provide a crisis response
capability while promoting US influence and access...*

*Steps to achieve rationalization,
standardization, and interoperability will
significantly enhance the probability of success
in multinational operations.*

Joint Doctrine for Multinational Operations

Joint Publication 3-16 (5 April 2000)

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STRATEGIC ANALYSIS, INC.

3601 Wilson Boulevard ♦ Suite 500 ♦ Arlington, Virginia 22201 ♦ 703.527.5410 ♦ www.sainc.com



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